

SEALED TOILET

Background

The present invention relates to a system and method for flushing a toilet.

5 More particularly, the present invention relates to a system and method for flushing a toilet having a movable bowl.

Many toilets include a bowl having a fluid path that includes a trap to allow water to remain within the bowl. Following use, a flush operation drains the contents of the bowl and refills the bowl with a quantity of fresh water. During the flush
10 operation, the contents of the bowl often splash and expel minute droplets of fluid into the air. Small air currents easily disperse these droplets, thus producing a cloud of invisible droplets. The droplets may contain small solid particles, microbes, or viruses. Thus, the act of flushing the toilet, under certain conditions, may contribute to the spread of communicable diseases (e.g., Severe Acute Respiratory Syndrome
15 (SARS))

Often, toilets are contained within small rooms that include vent fans. Operation of these vent fans draws air out of the room during a flush operation, further spreading the cloud. The increased spread of the cloud increases the likelihood that any disease borne in the waste will be spread.

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Summary

The present invention provides a toilet comprising a bowl and an enclosure. At least one of the bowl and enclosure are movable relative to the other of the bowl and enclosure between a first position and a second position. When in the first
25 position the bowl is sealably enclosed within the enclosure and a vent is operable to admit air into the enclosure.

The invention also provides a toilet comprising a housing at least partially defining a flush space. A movable wall is movable between a first position and a second position. The movable wall and the housing cooperating to define the flush space. A vent is in fluid communication with the flush space and is operable to admit
5 air into the flush space. A flushable bowl is coupled to at least one of the movable wall and the housing such that when the movable wall is in the first position, the flushable bowl is sealably enclosed within the flush space.

The invention also provides a method of flushing a toilet. The method comprising providing a movable bowl, moving the bowl into a substantially air tight enclosure, and initiating a flush operation. The method also includes admitting air
10 into the air tight enclosure through a vent.

Brief Description of the Drawings

The description particularly refers to the accompanying figures in which:
15 Fig. 1 is a perspective view of a sealable toilet in the open position;

Fig. 2 is a perspective view of the sealable toilet of Fig. 1 in the closed position with the doors removed;

Fig. 3 is a perspective view of the sealable toilet of Fig. 1 in the closed position with the doors closed;

20 Fig. 4 is a top view of a limit switch positioned in a cabinet; and

Fig. 5 is a side view of a portion of the cabinet including a seal member.

Before any embodiments of the invention are explained, it is to be understood that the invention is not limited in its application to the details of construction and the arrangements of components set forth in the following description or illustrated in the
25 following drawings. The invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the

phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of “including,” “comprising,” or “having” and variations thereof is meant to encompass the items listed thereafter and equivalence thereof as well as additional items. The terms “connected,” “coupled,” and “mounted” and variations thereof are used broadly and encompass direct and indirect connections, couplings, and mountings. In addition, the terms “connected,” “coupled,” and “mounted” and variations thereof are not restricted to physical or mechanical connections or couplings.

Detailed Description

With reference to Fig. 1, a sealable toilet 10 including a bowl 15, a cabinet 20, and two doors 25 is illustrated. The bowl 15 is similar to common bowls used in standard toilets. The bowl 15 includes a trap portion 30 and a pivotable seat 35. The pivotable seat 35 attaches to the bowl 15 and provides additional comfort when using the toilet 10. The seat 35 can be pivoted up or can be placed on the bowl surface for use.

The trap portion 30 provides a trap that facilitates the flushing operation and provides an air tight seal between a sewer system or other collection system and the bowl 15. The air tight seal inhibits the admission of sewer gas into the toilet 10 during periods when the toilet 10 is not being used.

The bowl 15 is supported by a pivotable arm 40 that attaches to an interior of the cabinet 20 or to another surface and is movable between an opened position and a closed position. The pivot arm 40 supports the bowl 15 and has sufficient strength to support the weight of a person seated on the bowl 15. When positioned in the open

position as illustrated in Fig. 1, the toilet 10 can be used. However, in this position, the bowl 15 cannot be flushed as will be described below.

The cabinet 20 at least partially defines an enclosed space 45 that is large enough to contain the entire bowl 15 when the arm 40 is moved to the closed position.

5 The two doors 25 attach to the front of the cabinet 20 and are movable between an opened position and a closed position. When the doors 25 are in the open position, they allow access to the bowl 15 and movement of the bowl 15 between the opened and closed position. In the closed position, the doors 25 sealably contact the cabinet 20 to close a cabinet opening 50. In some constructions, one or more latches hold the
10 doors 25 firmly in the closed position. In other constructions, one or more biasing members such as springs or door hinges bias the doors 25 into the closed position. It should be noted that while two doors 25 are illustrated, other constructions may use a single door or more than two doors to fully enclose the enclosed space 45.

In some constructions, a seal member, such as a rubber seal 55 (shown in Figs.
15 2 and 5) extends around the cabinet opening 50 and contacts both the doors 25 and the cabinet 20 when the doors 25 are in the closed position. Fig. 5 illustrates one possible configuration of the rubber seal 55 with many other configurations being possible. In addition, there is no requirement that the seal 55 be rubber, as many other materials are well suited to providing a seal between the doors 25 and the cabinet 20. The seal
20 55 improves the airtight seal and inhibits the unwanted flow of air out of the enclosed space 45.

An air vent 60 extends into the cabinet 20 to provide a flow of air into the cabinet 20 during a flushing operation. The air vent 60 may include a check valve or flow restriction that inhibits air flow from the enclosed space 45 to the atmosphere,
25 while allowing substantially free flow into the cabinet 20.

Fig. 2 shows the bowl 15 in the closed position within the enclosed space 45 with the doors 25 removed from the cabinet 20. As should be clear, the entire bowl 15 fits within the enclosed space 45. Because the bowl 15 pivots through an arc, a rotatable coupling is provided to inhibit leakage during movement of the bowl 15, while still allowing the water from the bowl 15 to properly drain during a flush. In another construction, a flexible pipe is employed to allow the bowl 15 to pivot while maintaining a water tight seal.

Turning to Fig. 4, a sensor, such as a limit switch 65, is illustrated as being located adjacent the doors 25 to detect when the doors 25 are in the closed position. While many types of sensors 65 are possible (e.g., proximity probes, optical sensors, and the like) limit switches 65 are illustrated. The limit switches 65 open or close a circuit in response to the doors 25 being fully closed. The switch 65 of Fig. 4 extends beyond the closed position of the door 25 such that the closed door 25 depresses the switch 65 and opens or closes a circuit. While both doors 25 are shown with limit switches 65, other constructions may employ a single switch 65.

Some constructions may employ sensors that indicate the position of the bowl 15 as well as, or in place of the sensors that detect when the doors 25 are closed. These sensors can be used alone, or in conjunction with the limit switches 65 depending on the arrangement of the toilet 10. For example, in one construction movement of the doors 25 and the bowl 15 are linked, thereby allowing a single bowl sensor to indicate when the bowl 15 is in the closed position and the doors 25 are also in the closed position.

With reference to Fig. 3, the cabinet 20 is shown with the bowl 15 in the closed position and the doors 25 attached and located in the closed position. As can be seen, the bowl 15 is completely enclosed within the cabinet 20. A switch or flush button 70 located on the outer surface of the cabinet 20 is operable to initiate the

flushing sequence. In other constructions, the switch 70 is located on the outer surface of the door 25 rather than the cabinet 20. In still other constructions, the flushing sequence initiates automatically when the doors 25 are closed and no button 70 is required.

5 In operation, a user opens the doors 25 and pivots the bowl 15 to the open position. In some constructions, a linkage between one or both of the doors 25 and the bowl 15, or a biasing member automatically pivots the bowl 15 into the open position as the doors 25 are opened. Once opened, the bowl 15 can be freely used. To flush the bowl 15 after use, the user first pivots the bowl 15 back into the cabinet
10 20 and then closes the doors 25. The user depresses the flush button 70 to initiate the flush sequence. If the user depresses the flush button 70 before the limit switches 65 are both actuated, the bowl 15 will not flush. Thus, the limit switches 65 assure that the bowl 15 is sealed in the enclosed space 45 before the flush sequence begins.

 In some constructions, a solenoid operated valve opens in response to the flush
15 button 70 to initiate the flushing sequence. A closed circuit results when the flush button 70 is depressed and the limit switches 65 indicate that the bowl 15 and the doors 25 are in their closed positions. Once flushing is initiated, the solenoid operated valve opens to admit a quantity of water into the bowl 15. Following the admission of water, the flush sequence proceeds in much the same manner as a standard toilet.

20 It should be noted that while the description herein and the figures describe a bowl 15 that pivots between an open position and a closed position, other constructions may employ other types of movement. For example, one construction may employ a bowl that slides or extends in a substantially linear or a non-linear fashion.

25 In other constructions, a combination of linear and pivoting motion may be used. In still other constructions, the bowl remains stationary and the cabinet or a

portion of the cabinet moves to enclose a bowl that is fixed in a stationary position. For example, one construction employs a pivotable cover that sealably engages the outer surface of the bowl such that the cover covers the top opening of the bowl. In this construction, much of the bowl remains visible, however the top opening of the bowl is substantially sealed from the environment.

In still another construction, a bowl is fixed within a sealable room having a door. In this construction, the user enters the sealable room to use the toilet. After use, the user exits the room and closes the door to seal the room in order to flush the toilet.

In yet another construction, both the bowl and the cabinet move together to enclose the bowl. Thus, as one of ordinary skill will realize, there are many ways to enclose the bowl within a sealable enclosure.

It should also be noted that the foregoing discussion described a sealable enclosure. It should be understood that the term "seal" or any derivation thereof should be understood as substantially preventing the flow of fluid. However, the term "seal" or any derivations thereof should not be interpreted as requiring a perfect or hermetic seal. Rather, as applied to the present invention, the seal need only be good enough to substantially inhibit the flow of air into or out of the enclosed space through any route other than the vent.

Although the invention has been described in detail with reference to certain preferred embodiments, variations and modifications exist within the scope and spirit of the invention as described and defined in the following claims.